Library of Congress NOV 2 - 1921

American Gas Journal

Formerly American Gas Light Journal

EST. 1859

VOL. 115, NO. 18
WHOLE NO. 3321

NEW YORK, SATURDAY, OCTOBER 29, 1921

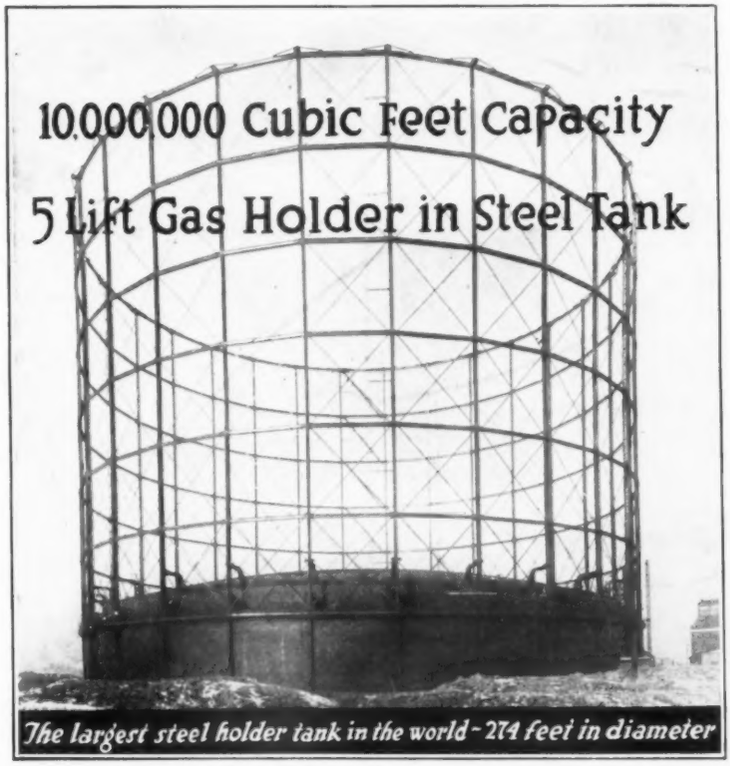
Subscription $3 per year
$4 Canada $5 Foreign

GAS HOLDERS

Ability to meet unusual conditions is one of the qualifications of the Bartlett-Hayward Company. Long experience, exceptional facilities and specialized organization enable them to do this.

Completion of foundation and holder in 300 days after receipt of order is record time for class of construction illustrated below.

Gas holders of all sizes ranging from 100,000 to 15,000,000 cu. ft. capacity. Holders built and now under construction total 476 in number, with combined capacity of 469,679,332 cu. ft. One hundred and sixteen of these holders have a capacity of from 1,000,000 to 15,000,000 cu. ft., with an aggregate capacity of 391,523,932 cu. ft. The remaining 360 holders have a total capacity of 78,155,400 cu. ft.


10,000,000 Cubic Feet Capacity
5 Lift Gas Holder in Steel Tank
The largest steel holder tank in the world - 274 feet in diameter

Two holders, each of 10,000,000 cubic feet capacity, and one of 15,000,000 cubic feet, now under construction.

THE BARTLETT-HAYWARD CO.

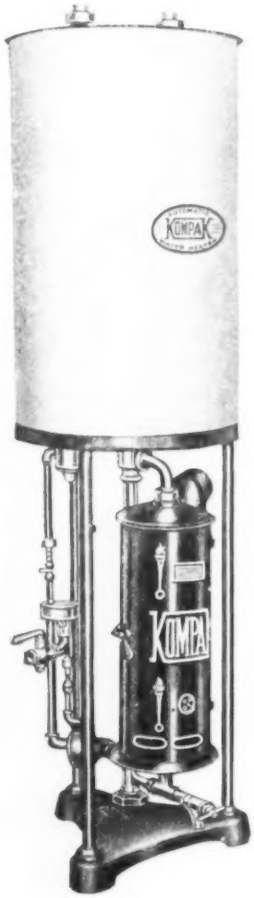
ENGINEERS AND FOUNDERS

BALTIMORE :: NEW YORK

INDEX TO CONTENTS, PAGE 4 ADVERTISERS' INDEX, PAGE 24

Just Suppose:---

Suppose you sell John Smith a water heater with only one thermostat. Suppose the pilot of John Smith's water heater went out and the gas escaped. Suppose John Smith discovers that there is on the market a water heater with TWO thermostats. One thermostat to control the temperature of the water, the other to shut off the gas to the heater should the pilot go out. Wouldn't John Smith be apt to wonder why you didn't sell him a Kompak in the beginning?



KOMPAK

TRADE-MARK
REG. IN U.S. PAT. OFF.

Water Heaters Have **2** Thermostats

THE KOMPAK CO.

New Brunswick
New Jersey

C. B. BABCOCK CO.
San Francisco
Pacific Coast Representative

81

American Gas Journal

Formerly American Gas Light Journal

Vol. CXV, No. 18 NEW YORK, OCTOBER 29, 1921 Whole No. 3321

Some Notes on a Distribution System

A Theory Advanced as to What Constitutes an Ideal System

By GEORGE WEHRLE

Superintendent Gas Department, Denver Gas & Electric Light Company, Denver, Colo.

The commonly accepted practice in the distribution of gas covers delivery to the customer at low pressures, usually with a separate system of trunk or transmission mains feeding into the low-pressure main system at certain points through district governors. The low-pressure system, which comprises the greater portion of the total distribution system, is amply proportioned to maintain a minimum pressure drop in the low-pressure mains between the governor and the customer's meter. The smallest size of main adopted as the standard by most companies is 4 in., which has been arrived at rather arbitrarily.

While the practice above referred to offers a solution for the distribution problems of growing cities, being adaptable to any low-pressure system in use, in some measure, the cost of accomplishment is often lost sight of and conductivity of the general main system not properly taken advantage of. Too much importance is usually placed upon the value of pressure reduction, which is attained by the installation of large supply mains carrying low pressure. While the reduction of distributing pressure has a decided advantage within certain limits, this advantage is decidedly expensive if the limit is not properly fixed. Since the laws governing the flow of gas in pipes allow volume to be increased, either by increased area or pressure, the one of least cost and greatest efficiency should be applied. With due regard for the opinions and theory of the average gas engineer, he usually considers pressures over 6 in. water column in his low-pressure distribution system as something reflecting upon his ability and to be avoided at any expense. From the experience of the Denver company, it has been found that for the distribution of gas to residential districts 2-in. mains are of ample size and larger pipes a waste of investment.

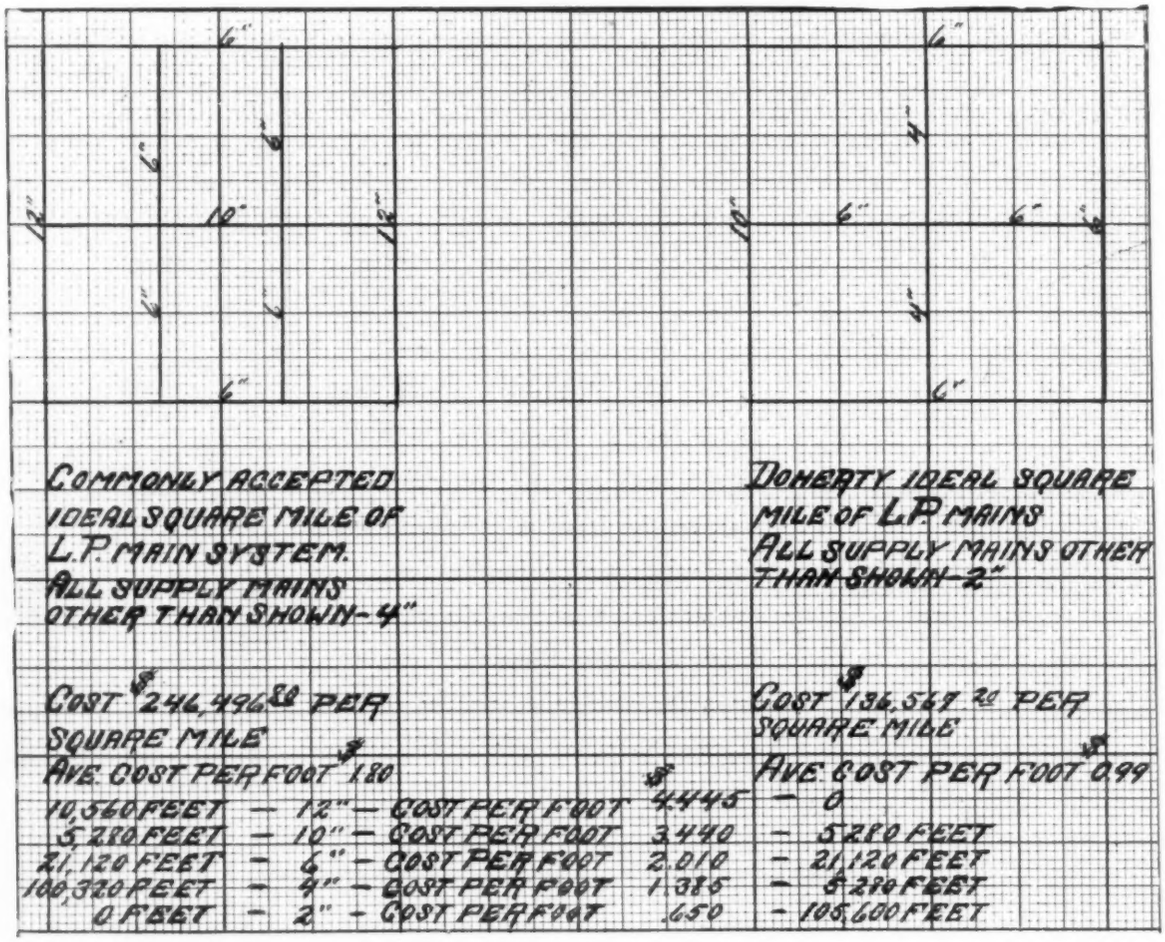
In the city of Denver the use of 2-in. mains for supplying gas to residential districts was started by H. L. Doherty some twenty years ago. At the present time, out of a total of 370 miles of mains in use, 200 miles, or 54 per cent, are of 2-in. size. During the past ten years 90 per cent of the mains laid have been 2 in., with the other 10 per cent consisting of extension of feeder mains required. Mr. Doherty's theory of ideal distribution, affecting the size of mains, is based upon two fundamentals: reduced capital investment and consequent interest charge, and reduced pipe area as affecting lost and unaccounted-for gas. Through the first principle he saves 50 per cent in investment and interest charges, which allows the main to be replaced, if necessary, at a later date through lesser longevity or increased consumption, and money still be saved. The second principle allows higher general pressures to be carried without increasing lost and unaccounted-for gas, thus obviating the necessity for a separate high-pressure main system and working back to the obviation of a necessity for larger supply mains. In the attached data sheet is shown an ideal square mile of low-pressure distribution system compared with the Doherty ideal. The unit cost per foot for the various sizes of main is worked out from the universal tables compiled by the writer and published in Lefax Information, various technical journals, and the handbook "American Gas Works' Practice" in 1918, and are, as of present date, using Denver wage scales and material prices. While the unit costs would vary in other localities according to conditions there existing, the ratio would be identical between the two in any city. It is seen that the average cost per foot of main of any size in the commonly accepted square mile is $1.80, while that of the Doherty square mile is 99 cents. If the 370 miles of mains in Denver were replaced at the present time (disregarding paving ex-

As Mr. Wehrle points out, there may be those who will disagree with him as to what constitutes an ideal distribution system, but his thoughts on the subject are based on his observations and experiences. At any rate, the article is worthy of the earnest consideration of every gasman.—Editor.

pense) in accordance with the commonly accepted idea, the cost would be $3,516,480, whereas under the Doherty idea the cost would be $1,934,064, making a saving for the latter plan of $1,582,416. This comparison does not take into account the probable paralleling of some low-pressure mains with the high-pressure feeder system usually employed, which would make the difference in cost even greater.

What They Do in Denver

In the Denver system, pressures are carried at the boosting stations sufficient at all times to maintain a minimum of 3 in. water column and a maximum of 5 in. at the lowest pressure point in the system. This requires excessively variable or high pressures on the greater part of the distribution system, which is taken care of by the installation of individual service regulators. In order to obtain the required conductivity of the small mains, district governors cannot be generally used, as they would defeat the purpose of the scheme and bring us back to the one under comparison requiring larger supply mains in order to obtain the volume necessary. A certain range of allowable pressure has been adopted, depending upon the capacity of the boosting plants and the effect upon lost-and-unaccounted-for. When this limit is reached, a district holder and boosting plant is installed in a carefully selected, advantageous location and general pressures thereby again reduced to the allowable range. In this way we also take care of storage capacity required. The limit we have set on the maximum pressure from a station is 90 in. water column, which gave us an average lost-and-unaccounted-for of 15 per cent. Recently the installation of two new stations reduced the average pressure practically two-thirds, and the lost-and-unaccounted-for one-half, while no mains of any kind were required. Out of a total of 50,000 services in use, 30,000 of them require regulators, the cost of which is more than taken up in the system under comparison by the transmission main system required and district main governors employed.


COMMONLY ACCEPTED IDEAL SQUARE MILE OF L.P. MAIN SYSTEM.
ALL SUPPLY MAINS OTHER THAN SHOWN-4"
COST $246,496.88 PER SQUARE MILE
AVE. COST PER FOOT $1.80
10,560 FEET — 12" — COST PER FOOT $.4445
5,280 FEET — 10" — COST PER FOOT .3440
21,120 FEET — 6" — COST PER FOOT 2.010
100,320 FEET — 4" — COST PER FOOT 1.385
0 FEET — 2" — COST PER FOOT .650
DOHERTY IDEAL SQUARE MILE OF L.P. MAINS
ALL SUPPLY MAINS OTHER THAN SHOWN-2"
COST $136,547.20 PER SQUARE MILE
AVE. COST PER FOOT $.99
— 0
— 5,280 FEET
— 21,120 FEET
— 5,280 FEET
— 105,600 FEET

In the Doherty scheme of distribution, advantage is taken at all times of the increased conductivity obtained through a supply obtained from both ends of a small main, or the middle, discharging in the middle, at both ends, or along the length of the main. The eliminating of dead ends or supply mains fed from one end only is avoided to as great an extent as is possible. We thereby take advantage of the law governing the flow of gas in pipes, whereby the volume delivered from a pipe fed from both ends discharging in the middle or along its length, or a pipe fed from the middle, discharging at both ends or along its length, is to a pipe fed from one end as 2.8 is to 1. For the same volume the pressure drop is as one-eighth is to 1 For the same volume and pres-

sure drop the length may be as 8 is to 1 and, all other conditions being equal, the diameter may be as 0.66 is to 1. Attention must be given to locations of feeder mains supplying the 2-in. network, since this is an important feature of our system. The feeder mains are, however, smaller than those commonly employed, since the same laws are applied to these as in the supply system.

The Denver distribution system has experienced the same evolutionary steps as most every other city, and is therefore not wholly constructed as it would be if entirely designed according to the Doherty ideal. These ideals are followed in new work as closely as possible, taking the best advantage of existing mains. The service given customers is as near ideal as in any city we know of. Pressure complaints are an unknown feature, and after twenty years' use maintenance and replacement cost is a negligible expense. The total main maintenance expense for the year 1920 was $3,032.59, of which $573.60 was for material and $2,458.99 for labor. Based upon a valuation of $2,000,000, as previously computed under the cost per foot of main in a Doherty square mile, this would represent a yearly maintenance expense of 0.0015 per cent, which is exceedingly low when it is considered that some of the mains have been in use over forty years and the greater portion of the 2-in. mains from fifteen to twenty years.

Developing the By-Product Business

Proper Utilization Adds Value of $38 to Ton of Coal

By RICHARD BUCKMASTER

It is an old story how the production of benzol from coal gas was brought about by a mistaken notion that oxalic acid could be made from coal-tar gas and nitric acid. An alert and very observant chemist, in repeating this attempted synthesis found not only that oxalic acid was not formed, but that nitro benzol was produced with benzol dissolved therein. That was the beginning of the recovery of benzol from coal-tar gas, and the addition to the then known sources of benzol of a source much greater and more dependable than any previously available.

When it became possible successfully to recover benzol from gas, a research chain was started that has enriched scientific or theoretical organic chemistry with a wealth of information and facts not only with respect to benzol, but naphthalene, anthracene, and the higher aromatic hydrocarbons.

All of these achievements have a very practical application. Coal is no longer rateable solely upon the basis of its fuel value. Coal by-products have added to the potential value of every ton mined until there are authorities who place the average potential by-product yield of a ton of coal at $38. This figure presumes an intensive utilization of coal by-products in the form of all the special chemicals, drugs, perfumes and dyes that have found a commercial use.

At the present time the potential by-product value of half the coal consumed represents waste. So far from utilizing the highly refined yields, our industry is not even utilizing the bulkier and crudely obvious by-products.

The figures concerning coal waste are so obvious that they have ceased to be impressive. Every time we burn a ton of raw bituminous coal we waste approximately 30 per cent of it. The total waste—annual waste in the United States—is approximately $1,000,000,000 a year. This is waste in terms of unrefined by-products, such as gas, tar, ammonium sulphate and benzols. This waste is distributed among the various States in the following proportions:

State	Total Value of By-Product Wasted
Alabama	$ 32,659,200
Arkansas	4,210,920
Colorado	11,571,000
Georgia	148,520
Illinois	119,741,000
Indiana	43,643,500
Iowa	7,869,200
Kansas	10,696,000
Kentucky	34,080,000
Maryland	6,210,320
Michigan	2,645,400
Missouri	6,417,600
Montana	2,865,000
New Mexico	6,488,780
Ohio	65,860,000
Oklahoma	7,298,100
Pennsylvania	329,061,120
Tennessee	12,598,540
Utah	9,999,000
Virginia	14,700,000
Washington	5,730,000
West Virginia	159,274,000
	$930,188,000

The increased cost of fuel is becoming a matter of serious concern, not only to American manufacturers, but to the householder as well. Fuel is one of the major items in competitive costs. In our largest competitive countries, such as Germany, France, Belgium, and England, they have for many years relied upon carbonization plants of various kinds, recovering and selling sufficient by-products to reduce the final cost of fuel as much as one-half.

Utilization Dependent Upon Coal-Tar Industry

The utilization of coal by-products is, of course, dependent upon a general coal-tar industry. By-products have essential use in industries that have an annual production value in excess of $3,000,000,000.

The manufacturers of paper, printing inks, electroplating and photoengraving supplies, water-proofing materials, glass, glue, leather, paint, varnish and oil-cloth products, and rubber goods, as well as the metal industries, are all dependent upon chemicals that are coal-tar derivatives.

The chemical industry probably more than any other

is dependent upon the application of much theoretical work and in order that the chemical industry may grow it is necessary that there should be brought to bear upon the manufacture of all the products the highest possible degree of chemical training. The beneficial interaction of practice upon theory and theory upon practice is evident in almost every branch of industrial chemistry. It has been brought to its highest efficiency, however, in the division that deals with coal by-products—dyes and synthetic medicines and drugs.

The utilization of the coal products involves not only saving 5,900,000 tons of ammonium sulphate now wasted and capable of increasing our annual wheat production 30,000,000 bushels a year if applied to the soil, but in developing a general coal-tar industry that will succeed in extracting every possible value from the coal we consume.

Cheaper fuel means lower production costs, and lower production costs decide economic battles. The complete utilization of coal by-products requires not only book knowledge but actual experience. Benzol is the base from which 233 dyestuffs are obtained. But benzol is simply the beginning of a chain of operations. For example: Benzol yields phenol—known to laymen as carbolic acid. Phenol treated with a diluting acid yields phenacetin—a common drug. Dilute phenol still further and it becomes nitric or sulphuric acid, which is then converted into picric acid, a powerful explosive. Develop the chain still further and we have chloropicrin—a poison gas.

But carbolic acid can yield perfume as well as death. If it is chloroformed it becomes salicylate fluorid, which when treated with sodium and acetic acid becomes coumarin—a perfume with the odor of new-mown hay.

During the month of August, 1921, an importer applied for a license to import a considerable quantity of coumarin. He was told that American manufacturers were able to supply his needs and at reasonable prices. The incident illustrates the exact method by which the utilization of coal by-products can be made to reduce fuel costs. The sale of coumarin represented an economy—a use of materials that have heretofore been wasted. The greater the sale of coumarin and similar products the greater the return from each ton of coal.

Recovery of Hydrocyanic Acid and Carbon Disulphide from Coke Oven Gas and Illuminating Gas

Discussion of Two Troublesome Impurities

By M. MINOT, Chimie et Industrie, 1921, 135-140

(Translated and abstracted by Ismar Ginsberg, B. Sc., Chem. Eng.)

Hydrocyanic acid and carbon disulphide are two very troublesome impurities in coke-oven and illuminating gas. Some coals—for example, those used in the manufacture of metallurgical coke—may yield as much as 1 gram of the acid in each cubic meter of gas produced in the Koppers furnace. In the process of purifying the gas with iron oxide, the acid vapors escape to a large degree. The acid attacks the metal of the gas holder and the meter, and also acts as a veritable poison on the purifying oxide.

With sulphide of iron in the nascent state and ammonia which is not recovered in the washers, the acid forms a double ferrocyanide of iron and ammonia in the purifiers. This compound envelops the particles of iron oxide and retards the action of the oxide on the sulphureted hydrogen in the gas. It also diminishes the absorptive capacity of the oxide for hydrogen sulphide. The result is that when the mass of purifying oxide contains about 50 per cent of sulphur it is no longer advantageous to use it any further or to treat it so that it may be used again, for the expense of the treatment is not compensated by the additional service that is obtained from it.

When the hydrocyanic acid is removed from the gas by preliminary purification before the latter reaches the iron-oxide boxes, then the formation of double ferrocyanides and other similar salts is avoided, the cleansing action of the iron oxide masses is increased, and the cost of the operation is reduced. In reality there are two advantages gained by this recovery of the hydrocyanic acid, namely: one, more effective purification of the gas in the iron-oxide boxes, and, two, an increased production of ferrocyanides and Prussian blues by making use of the recovered hydrocyanic acid.

Carbon Disulphide

Carbon disulphide occurs in the gases, obtained from the distillation of certain coals, to the extent of 0.3 gram per cubic meter of the gas. Practically all of the disulphide is removed by absorption in the oil used to extract the benzol and toluol from the gas. Past this step in the process of gas making, the latter contained only 0.06 gram of disulphide per cubic meter. When the benzol is distilled from the oil, the carbon disulphide is entrained with it and is allowed to go to waste into the air in the benzol purification process. The result is that appreciable quantities of benzol are lost in this manner by entrainment. The poor recovery of the carbon disulphide permits the production of a purer benzol and the obtaining of a better yield in its refining, as well as the manufacture of an important product, ferrocyanide

of soda, which is made synthetically from the hydrocyanic acid.

Recovery of the Hydrocyanic Acid and of Carbon Disulphide

There are many methods of recovering the acid, and the main difficulty lies in choosing the proper one. The best process may be ascertained by a careful study of the ammoniacal liquors obtained by condensation from the gas. In this liquor there are found two cyanogenated compounds, viz.: ammonium ferrocyanide and ammonium sulphocyanide.

The complex ferrocyanides of ammonia are produced in two ways:

1. By the reaction of hydrocyanic acid in the presence of ammonia on the sulphide of iron, which is itself formed by the action of the sulphureted hydrogen in the gas on the iron of the apparatus, according to the equation:

$$2FeS + 6HCN + 2NH_3 = (NH_4)_2Fe_2(CN)_6 + FeO + H_2O$$

2. By the further action of ammonia on the ferrocyanide, formed above, according to the equation:

$$(NH_4)_2Fe_2(CN)_6 + 2NH_4OH = (NH_4)Fe(CN)_6 + FeO + H_2O$$

The fixing of the small amount of hydrocyanic acid is accomplished, consequently, at the expense of the iron of the recovery apparatus. On the other hand, the sulphocyanide of ammonia is formed by the reaction of hydrocyanic acid in the presence of oxygen with ammonium sulphide, which results from the reaction of carbon disulphide and ammonia. The sulphide of ammonia is further changed into the bisulphide of ammonia by its reaction with the precipitated sulphur arising from the oxidation of the sulphureted hydrogen in the gas. The bisulphide then reacts with the hydrocyanic acid to give ammonium sulphocyanide and sulphide of ammonia, and the latter compound goes through the same reactions again. The reactions which have just been described may be seen more clearly from the following equations:

$$H_2S + O = H_2O + S$$
$$(NH_4)_2S + S = (NH_4)_2S_2$$
$$(NH_4)_2S_2 + HCN + NH_3 = NH_4CNS + (NH_4)_2S$$

They explain why it is that the ammoniacal gas liquors show only a small content of sulphocyanide at the moment when they are recovered and a much larger proportion of this compound after they have been standing for a few days. The hydrocyanic acid dissolved in the liquor converts the polysulphide of ammonia into sulphocyanide only, slowly. The industrial process for recovering carbon disulphide and hydrocyanic acid from gas is based in principle on these reactions.

The Principles of the Process

The detarred gas is made to pass through a solution of sodium polysulphide which contains about 80 grams of sulphide of sodium to the liter. This solution becomes saturated with the ammonia that is present in the gas and a certain amount of ammonium sulphide is formed. A reaction takes place between the hydrocyanic acid and the sulphur in the polysulphide solution, according to the following equation:

$$HCN + NH_3 + S = NH_4SCN \text{ (ammonium sulphocyanide)}$$

and the carbon disulphide content of the gas reacts in accordance with the equation given below:

$$(NH_4)_2S + CS_2 = (NH_4)_2CS_3$$

This is the way in which these two constituents of the gas are recovered. But there are certain by-reactions possible; for instance, the carbon dioxide in the gas reacts with the polysulphide of sodium, thus:

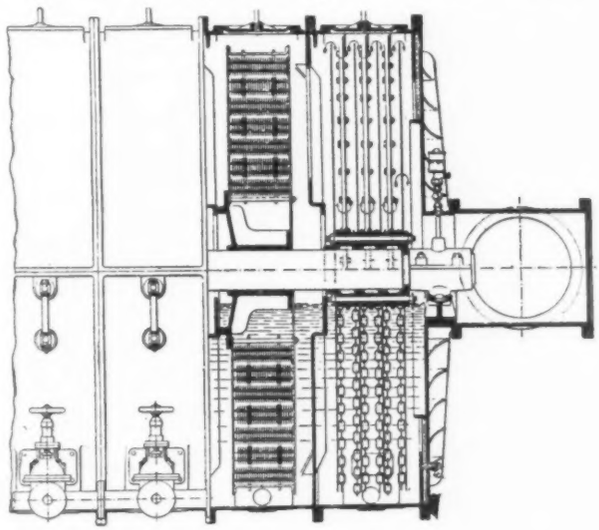
$$Na_2S_3 + CO_2 + H_2O \rightarrow Na_2CO_3 + H_2S + S_2$$

This results in a deposit of sulphur. The second reaction takes place between the oxygen in the gas and the polysulphide, thus:

$$2Na_2S_3 + 3O_2 = 2Na_2S_2O_3 + S_2$$

tending to result likewise in a precipitation of sulphur.

The carbon-dioxide reaction proceeds in the direction that is indicated because the concentration of this gas is about eight times greater than that of the



Cyanide Washer

The cyanide washer is constructed on the same principle as the standard type of washer. In general, it consists of five compartments which are closed by annular cylindrical rings, divided into two parts and held together by bolts. A steel shaft, turned by a steam engine and a worm-gear transmission, traverses the center of the apparatus. Within the interior of four of the chambers the shaft carries two circular sheets of metal and between them there are placed bundles of thin discs made of wood. Within all five compartments, the shaft supports discs made of circular sheet iron between which there are suspended chains which play the part of an agitator.

sulphureted hydrogen. This reaction takes place with a rapidity which is about equal to that of the hydrocyanic-acid reaction with sulphur (see above). The process goes on as if all the sulphur of the polysulphide is converted into the sulphocyanide. The polysulphide solution, which was colored yellow-brown at the outset, finally loses all its color. When this happens the solution is found to contain sulphide of ammonia carbonate and sulphide of ammonia carbonate of soda, sulphocarbonate of ammonia and a little hyposulphite of ammonia.

The solution is removed from the tank and is distilled. The carbonate and sulphide of ammonia are evolved as vapors and go to the sulphation vats. The sulphocarbonate of ammonia is thereby decomposed into the sulphocyanide according to the following equation:

$$(NH_4)_2CS_3 = NH_4CNS + 2H_2S$$

The carbonate of soda decomposes the sulphocyanide and hyposulphite of ammonia to give the corresponding sodium salts.

Conversion of Sulphocyanide into Ferrocyanide

The solution of sodium sulphocyanide is evaporated to dryness. The salt is desiccated, then ground to a powder and mixed with the proper amount of pulverized iron. In order to avoid the loss by oxidation of a part of the cyanide, the mixture is charged into a tube which is electrically heated to a temperature of 450 deg. Cent. and which is closed at one end by a plug and at the other by means of an hydraulic joint. The ferrocyanide is extracted from the desulphurized mass in the usual manner and may be converted readily, if desired, from the sodium salt into the potassium salt.

The Technical Operation of the Process

The process is patented in France (French patent No. 516,652). In this patent three raw materials are described which are used in the process, viz.: sulphide of sodium, spent oxide from the purifiers, and ground iron. The sulphide of sodium is generally made at the gas plant itself. Its manufacture will not be described here.

The spent oxide is used to supply the sulphur. The sulphur that is contained in this oxide is sufficient to recover all of the hydrocyanic acid in the gas. (The author proves this by calculation.)

The Technology of the Operations

The first step is to make the polysulphide solution. Sulphide of sodium is dissolved in water to obtain a solution which contains about 80 grams of Na_2S per liter. This solution is then used to extract the spent oxide, enough of the solution and of the oxide being used to obtain the polysulphide Na_2S_3. This can be done without any difficulty. (The author gives a detailed explanation of how this is done.) The solution of polysulphide is separate from the regenerated oxide by means of a filter press, and the filter cake is washed with water. The first wash water is used to obtain the required concentration of sodium sulphide by dilution of the polysulphide solution. The other wash waters are used to dissolve new sodium sulphide in the place of pure water.

The next step is to use the polysulphide solution in washing the gas. This is accomplished in a washer of the standard type, which is divided into three compartments. These compartments are necessary, for the polysulphide solution must be given enough time to decompose completely and this could be obtained in a continuous-flow apparatus only by the use of very large washers with large surface area. At the best this sort of apparatus would be difficult to regulate and there would undoubtedly be a loss of hydrocyanic acid in the course of the charging and discharging of the washers. In the washer provided with three compartments the liquor is moved from one compartment to the other by means of an arrangement of montejus, charging tanks and valves.

There are many types of the three-compartment washer which will give good service. The washer should be located immediately after tar extractors, or, if the detarring process of the gas takes place in the hot state, after the cooling condensers. Two factors are of importance at this point. In the first place, the gas must contain as much of its ammonia as possible, as the ammonia is used in the fixation of the hydrocyanic acid. In the second place, the gas must be cold so that the polysulphide solution may be able to dissolve as much ammonia as possible. A temperature of 21 to 23 deg. Cent. is most satisfactory.

The third step in the process is the elimination of the ammonia when the liquor in the first compartment of the washer is spent and will not react any further. This may be told very easily by taking a sample of it and adding muriatic acid. If there is no longer a precipitation of sulphur the liquor is spent; then it is pumped out of the washer and removed to a steam-heated still. This is provided with a steam coil, and also with means of injecting steam into the solution directly. The free ammonia is distilled first by passing steam through the steam coil; and then, when all the ammonia that will evaporate is removed, the remaining solution is analyzed to ascertain its content in fixed ammonia and sufficient soda-ash solution is added to react with the same. The heating is now conducted by injecting the steam directly into the solution. The ammonia vapors are recovered in the usual manner and are used to make sulphate of ammonia or are concentrated to give the commercial grades of ammoniacal liquor.

The fourth step consists in cooling the liquors which have been freed of their content of free and fixed ammonia. They are run into coolers, which are tanks made from sheet metal and provided with covers and coils through which the cooling water is run. There is also a safety valve to release the gases that may be generated within the tank. The purpose of cooling is to harden the small quantity of tar that is absorbed from the gas in the polysulphide liquors.

The fifth step is to filter the liquor, and then it is concentrated in a Kestner evaporator or a multi-effect evaporator. The solution coming from the evaporators is about 50 deg. Be. The concentrated liquor is evaporated to dryness in a drum drier.

(*Continued on page 392.*)

Gas Furnaces for Cooking Candy*

How Gas Has Helped to Increase the Confectionery Business

By JAMES BEVERIDGE

In the last few years the candy industry in this country has increased to a very great extent and gas as a factor can claim a great deal of credit in the success of this industry.

In considering the confectioners' trade, especially the wholesale manufacturing end, it is very essential that they have speed in operation. Speed in operation means a saving in labor costs and a greater output and in order to obtain this result, combustion of our fuel must take place at a high rate. This is being done with the blast type of furnace.

However, before going into the blast burner, we will consider the atmospheric, which is familiar to most gasmen. The essential parts of such burners are the gas manifolds into which the gas enters and from which it passes through the cocks and from there to the air mixer, which has a gas orifice at its end consisting of a brass spud with a hole in it.

The gas flowing through this small hole has its velocity increased and by this means entrains air through the mixer into the mixer pipe. The mixture of air and gas passes to the burner head, where it is burned.

Burners having a capacity of 150 cu. ft. to 300 cu. ft. are very suitable for candy furnaces.

This explanation of atmospheric burners will enable us to understand the blast burner and the importance of the blast candy furnace better than if no outline had been given.

In the blast furnace, air enters directly into the mixer pipe through a cone-shaped nozzle. This increases its velocity, causing a partial vacuum at that point. Gas enters by a mixing tee at right angles at this point and the vacuum formed by the air nozzle draws in the gas which mixes with the air. Thus it will be seen that the blast burner is just the reverse of the atmospheric.

In the case of the blast furnace, air enters at a high pressure, entraining the gas at a lower pressure, while in the atmospheric burner the gas entrains the air but, owing to the low pressure of the gas, not enough air is entrained for combustion which necessitates a secondary air supply.

Due to the pressure and velocity of air with the blast burner, the rate of combustion is materially increased, which in turn increases the temperature and consequently the speed of operation.

Speed Is Essential

Speed in candy making is very essential. It not only produces a clearness of hard candies, a better product, but is more efficient, a saving in labor and increases the output.

The method of supplying air to blast furnaces are by the fan blower and positive-pressure blower. The fan blower is considered the best, as it supplies sufficient air for candy cooking and can be operated at a lower cost than the positive-pressure blower.

The positive-pressure blower is only desirable where air at one and one-half pounds pressure is already available or where the consumer demands it. A positive-pressure blower requires about one horse-power, where the fan blast requires about one-tenth horse-power.

Advantages Claimed for Fan Blast Type

Summing up, therefore, the fan-blast type of furnaces is the most desirable for most purposes, due to their great speed, low cost of operation and their convenience, simplicity, durability and economy.

Motor blowers are made so as to operate with 110 and 220 alternating and direct current. They are directly connected and should be installed close to furnace with as few bends as possible to avoid resistance of air supply.

Candy furnaces should be designed to eliminate as much loss of heat by radiation as possible.

The best method of installation is by utilizing the flue gases from the furnace, which pass from the fire pot into the circular flue and out the chimney. Furnace is so constructed that the products of combustion must travel around the furnace before entering the chimney thus making the flame come up evenly around the kettle instead of being drawn to the side where the chimney is located.

Lining Fire Pots

The shape of the fire pots should always be such as to reflect the heat of the flame against the kettle. Fire pots should be heavily lined with sectional fire brick or properly designed insulation to reduce the loss of heat to a minimum. Having this proper insulation not only saves gas consumption but is more comfortable for the candy maker.

Furnaces are equipped with rings, making furnace adaptable to all sizes of kettles. Their object is to hold a small kettle close to the flame so that the same economy can be obtained as with the larger kettles.

The fan-blast gas candy furnace is undoubtedly now the standard appliance with all good candy makers, and can take the place of coal or coke furnaces at a material saving.

While the blast furnace holds first place among equipment of large candy manufacturers, the atmospheric furnace is the best appliance for the retailer or small manufacturers. While they are not so rapid as the blast furnaces, they are ideal for small manufacturers. A good atmospheric furnace is much faster than coal or coke and above all things is clean and sanitary.

Studies are being made by manufacturers of electric appliances to perfect an electrically-fired confectioners' furnace, but from all information that can be gathered, they will not hold a candle with gas furnaces. However, the mere fact that electric men are endeavoring to encroach upon the gas field should cause we gasmen to exercise every effort to see that nothing but the best appliances be used.

*Paper read at Pacific Coast Gas Association convention.

Gas-Fired Boilers for Heating*

The Advancement That Has Been Made

By M. L. PAGE

Since primitive man first made use of fire down to the present time the steps in the development of heat control have been few and far between. With no housing but the sky, it was necessary for man to huddle near the fire in order to keep warm. Later a crude tent was used in which the fire gave better results. As man has progressed he has constructed better buildings, but until very recently he has not devised means by which house heating can be automatically controlled.

The better a building is constructed, the less heat is required and the cost of heating it is lessened.

There are three factors necessary in laying out a steam or hot-water heating system: Sufficient radiation, boiler capacity, and the piping must be of proper size.

While it is probably not necessary here to explain at length what steam and hot-water systems are, it may be well to outline the action of each.

In a steam system the boiler, placed in the basement, is partly filled with water. The water is boiled, forming steam, which develops a pressure great enough to force the steam through the piping and radiators. The air surrounding the radiators, being colder than the inside of the radiator, causes condensation of the steam, and this hot water drains back to the boiler through the return system of piping. Steam is maintained at about two pounds pressure.

In the hot-water system the boiler, piping and radiators are entirely filled with water. The water in the boiler is warmed and expands, and for the same volume weighs less than the cold water in the piping system. Thus the heated water is forced out of the boiler and the incoming supply to the boiler is warmed and a circulation results through the piping and radiators. Due to the fact that more space is required for this water after it is thoroughly warmed, it is necessary to place an "expansion" tank above the highest point in the system to hold the increased volume of water without allowing it to go to waste with the heat it contains. The temperature of the hot water as it leaves the boiler is usually 180 deg. Fahr.

The heat emission per square foot of steam radiation per hour per degree difference in temperature between steam and surrounding air is about 1.65 B.t.u. The temperature of steam at two pounds pressure is 219 deg. Fahr., so $219 - 55 = 164 \times 1.65 = 260$, the radiation per square foot of surface per hour.

Hot Water Radiation

In hot-water radiation the heat emission is about 1.5 B.t.u. and the hot water is about 170 in the radiator; then $170 - 55 = 115$, and $115 \times 1.5 = 163$, the radiation per square foot per hour for hot water. It is readily seen then that in hot-water the radiators must be about 50 per cent larger than in a steam system.

The steam system costs less to install because the radiators can be smaller, as they operate at a higher temperature, and the piping to supply the steam can usually be smaller, while the return pipng from the hot-water radiators must be equal to the supply. Then there is the added cost for installing the expansion tank. The steam system has an advantage over the hot water in allowing for quicker heating, it being much more flexible than hot water. In our California climate it is especially to be recommended.

One very important factor in house heating is temperature control. This is possible by using the automatic gas-fired boiler. This boiler is the horizontal, tubular type. The special design of the tubes and their "staggered" position forces the heat to travel a distance of one foot further than the perpendicular distance from the burner to the flue. Baffle plates on the sides of the boiler increase the heat travel and keep the heat in contact with the tubes. A baffle plate under the boiler distributes the draft evenly and causes each burner to act at maximum efficiency. This boiler has a guaranteed efficiency of 80 per cent.

Can Be Equipped with Cut-off

This gas-fired steam boiler can be equipped with an automatic low water fuel cut-off which positively cuts off the gas supply to the burners if for any reason the water in the boiler gets to the danger point, and the gas valve will not pass any gas until water is admitted to the boiler. This low-water fuel cut-off is the best kind of insurance against having a cracked section to replace. The regular equipment which comes with this boiler consists of gas-pressure regulator, automatic snap-action fuel-control governor, steam gauge and water-column try cocks, blow-off cocks, pilot lights and draft hoods. If to this equipment the room-temperature regulator is added the heating is entirely automatic. The fuel-control governor operates on a slight change in steam pressure so that, independent of the room-temperature regulator, the steam is kept automatically at a given pressure so long as heat is desired. The room-temperature regulator, in addition to the automatic heat control, has an eight-day clock which can be set to turn the gas on at the boiler at a predetermined time in the mornings, say, a half hour before the time of arising, and in the same way shut off the gas at night. Winding the clock once a week is all the work necessary to keep a uniform heat throughout the house. The same result can be attained with a hot-water system, the equipment being essentially the same, except that a thermostat automatically shuts off and turns on the gas to maintain the water at 180 deg., Fahr. in the outgoing line from the boiler.

As to the cost of operation, all the data indicates that, based upon rates in San Francisco and the Bay districts of California, the cost is about 60 cents per square foot of radiation per year. In competition with oil the ratio of cost figured only in dollars and cents, assuming gas

(*Continued on page 392.*)

*Paper read at Pacific Coast Gas Association convention.

As the Journal Views It

TABLE OF CONTENTS

The Table of Contents will be found on page 4 of the advertising section, Hereafter it will be found on that page each week.

Come to the A. G. A. Convention

Final arrangements are being made as this issue goes to press for the third annual convention of the American Gas Association, and gasmen generally are turning toward Chicago with the hope that out of this session will come great good for the industry. The program which has been announced and the papers that already have appeared in the columns of the AMERICAN GAS JOURNAL are assurances that this year's gathering will provide material of interest and education such as never has been equaled in any convention. New inspiration and renewed hope is promised to the gasman who will have an opportunity to mix with his fellows and discuss his problems in relation to the welfare of the industry generally. And out of it all will come ideas that are bound to work for the good of the gas fraternity.

Those who are in a position to know estimate that the attendance this year will be the largest in the history of the industry and it is to be hoped that this prediction will be borne out. Nothing should be allowed to stand in the way of at least one representative from every company in the United States and Canada being present in Chicago when the first session is called to order. And it would be better still if every department were represented so that advantage could be taken of all of the sectional meetings.

But it is not only in the meetings that the gasmen will find much to aid him in his work. He also will find the companionship of men who are willing to discuss his perplexities and who can render advice and counsel that will bring new light.

The AMERICAN GAS JOURNAL desires to express the hope that the meeting this year will arouse enthusiasm as never has been done.

Chemical Practices

Much of this issue of the AMERICAN GAS JOURNAL is taken up with discussion of chemical problems, but we feel that the space thus devoted will indeed be of real service if from the articles gasmen are enabled to get something that will help in reducing manufacturing costs or of adding to the output.

The translation of M. Minot's article, which we present, will serve to give new light on how some of the problems of removing impurities from gas are handled abroad and much of this practice, we feel, can be adapted to American gas plants with splendid results.

"Who Are These Prophets?"

Recently, there has been some discussion as to what the future of the gas industry will be. The AMERICAN GAS JOURNAL has taken a small part in the general talk but it has not expressed anything but a general opinion. Just a few days ago, however, we encountered some statements that were made evidently through the ignorance of the writer and not through any real knowledge of what we can expect. When a man attempts to forecast prices without having at least some knowledge of the underlying factors we are enclined to believe that he is indulging in what may be charitably described as loose talk, to say the least.

There is no assurance of just what prices we are going to have to pay for raw materials, no matter where a particular enterprise may be located. There are too many disturbing conditions now existing for it to be possible for us to say that within the next few years we will pay certain prices for any given article. Who knows what the next few years will bring forth in the way of new processes of gas manufacture and gas distribution? We venture to say that even the men who to-day are at work on the experiments that we must depend upon for the future developments would not care to say that they are going to revolutionize the gas industry.

We believe thoroughly in the future of this industry, for we know that never has an emergency arisen in the past that has not been overcome by the industry, energy and capabilities of those who are the real leaders. Just a short year ago one of the leading gas engineers of the country went on record to the effect that the gas of the future was coal gas. Then within a few weeks we are informed he declared that he did not mean the statement to be as broad as it evidently was construed by the industry. Thus even a trained engineer with years of experience showed that he, with all his knowledge, did not like to be placed in the position of a prophet. Nor can those who are learning the business place themselves in the position of forecasting what may happen.

There are undoubtedly many ways for using gas as a fuel that have not yet been attempted. Just what these will lead to it is hard to say. But there will always be a market for our product. That we feel safe in saying.

Probably it will be necessary for us to advance the cost of gas for a time until the costs of the raw materials return to normal or until we have developed other methods of manufacture.

But as we are making progress let us not stop in the normal course of events to guess. Facts are what the gas industry wants at all times, not bouquets. The AMERICAN GAS JOURNAL can be depended upon to supply those facts.

Recovery of Hydrocyanic Acid and Carbon Disulphide from Coke Oven Gas and Illuminating Gas

(*Continued from page* 388.)

Conversion of Sulphocyanide into Ferrocyanide

The crude dry sulphocyanide of soda and the calculated quantity of ground iron filings plus an excess of 5 per cent are mixed together thoroughly in a mixer. Care must be taken to see that the iron is not oxidized. After mixing for several minutes, the material is charged into the reaction tubes, which are made of fire clay and are heated by a nichrome resistance coil. A temperature of 45 deg. Cent. is maintained for about two hours. As the reaction is exothermic, very little electricity is consumed. The tubes are then allowed to cool and are opened so that the complex sulphide, $FeS.Na_2S$, is decomposed by oxidation. The material is then removed from the tubes, it is extracted with boiling water, the solution is filtered and then crystallized.

The author gives a detailed cost sheet which shows all the various expenses incurred in the process and which also indicates the return in ferrocyanide and regenerated oxide. According to the calculations, there appears to be an excellent profit made in this process. The figures show that in order to produce 100 kg. of ferrocyanide of soda and 32 kg. of regenerated iron oxide there will be used 80 kg. of crude ammoniacal liquor containing 60 per cent of sulphur, 90 kg. of 65 per cent sodium sulphide solution and 85 kg. of ground iron filings.

A coal that will yield 1 gram of hydrocyanic acid in every cubic meter of gas and will permit the conversion of 25 per cent of its weight into gas will result in final production of 4.5 grams of ferrocyanide for every cubic meter of the gas. This presupposes a yield of 85 per cent in the process, which has actually been obtained.

The advantages of the process are as follows:

1. It permits the recovery of the hydrocyanic acid and carbon disulphide content of the gas.

2. It yields as the final product alkaline ferrocyanides which may be used in the dyeing of silk, in the manufacture of Prussian blue and of other mineral pigments, in the manufacture of guanidine, and nitroguanidine for use in safety explosives, etc.

3. It diminishes the cost of the purification of the gas by increasing the life of the purifying oxides and by regenerating these oxides so that they may be used further.

4. It permits an increase in the yield of benzol to be obtained, as well as a crude product which does not require as much refination.

Gas-Fired Boilers for Heating

(*Continued from page* 390.)

at 90 cents, is about 25 per cent higher for gas than "stove oil," on the basis of maximum flow of gas for the same number of hours of heating as with oil. This is not the case, however, because the gas is regulated automatically and does not burn unnecessarily as does the oil. It is also doubtless true that the wear and tear, cleaning and painting necessary to keep a house in condition where oil is the fuel used is easily 25 per cent higher than if no oil is used.

Experience covering a period of three or four years shows that there is practically no maintenance necessary in the operation of this type of boiler.

The system herein briefly described puts house heating on a plane never before made possible. It is heat control, for, as a consumer of one of the largest gas companies on the Pacific Coast remarked, "This system actually thinks for me. The house is uniformly warm and comfortable and I simply wind the clock once a week."

This is the acme of house heating.

New Department Renders Service to Manufacturers

Pittsburgh, Pa.—The Philadelphia Company has organized a department to assist the manufacturer with numerous factors entering into industrial problems. In announcing this new department, a very attractive ad has been appearing in Pittsburgh showing a picture of the Philadelphia Company Building and giving the information as follows:

Outposts of
Good Service

¶ In selecting a suitable location for a factory, or in expanding the business of a factory, the manufacturer ought to know where his operating costs will be the lowest; where his market will be the broadest; and where his largest net profits can be secured.

¶ To know these things, the manufacturer must make a close study of the sources of raw materials; of marketing distribution of the finished product; prevailing scales of wages; of housing conditions; the cost of living and recreational facilities for his employees; of sources, quality and cost of fuel and power; of tax rates; of available factory sites; of transportation facilities; and of many other factors too numerous to mention here.

¶ To assist the manufacturer in making these studies, and in order to help him select the one place where he can get the best services in power, light and transportation facilities, the Philadelphia Company has organized a department, consisting of a number of industrial specialists. These men are constantly engaged in making economic surveys relative to the suitability of localities that they may help manufacturers to locate or may assist them, if located, to expand their business.

¶ The services of this department are gratis.

¶ For information address

INDUSTRIAL DEPARTMENT,
Care PHILADELPHIA COMPANY,
435 Sixth Avenue.

Investigation of Scrubbing Apparatus and Cooling Systems*

An Effort to Provide Practical Information on This Subject

By R. A. McNEAS

San Antonio Public Service Company, San Antonio, Texas

The scrubbing of water gas and at the same time cooling the gas in such a manner as to secure the best removal of the tar and other impurities with the least possible condensation of the high tension vapors that can be carried to the burners has been a subject of utmost importance to the gas manufacturer for many years. Information on this subject is fragmentary and does not at all cover the subject. An effort was made in preparation of this article to get some practical information from the gas manufacturers of the South on the subject of scrubbing and water-cooling systems, but the answers to the questionnaire sent out were few and those answering lacked completeness, due in many instances to the indefiniteness of the questions asked. They are in many cases plainly contradictory. For the above reason and the lack of time for investigation of the many points that might be considered in a paper of this nature, we shall contribute only a few fragments to the already fragmentary information, and point out the needs of investigation along this line.

In the production of illuminating gas from bituminous coal and also in the production of carbureted water gas, or straight oil gas, the gas leaves the generating apparatus charged with vapors. These vapors are composed chiefly of members of the benzene or closed ring series of hydrocarbons, and are mainly high boiling, low tension compounds, together with a large amount of water vapor, and such generally recognized gaseous impurities as sulphureted hydrogen, ammonia carbon bisulphide, and cyanogen. Some of these vapors exist as such only at high temperatures; hence are dropped close to the generator. Others may reach the distribution system and will precipitate upon a slight reduction of temperature, tending to cause stoppage in the mains and services. Others may be carried along to the burner causing trouble there, and still others are objectionable, due to the obnoxious nature of their products of combustion. Hence it is necessary to remove most of the above compounds from the gas prior to distribution. This is done by different methods of cooling and scrubbing the gas. It is necessary to do more than merely cool the gas, on account of the tendency of the vapors to be entrained or carried along by the gas. The amount of sulphur and other impurities removed in this way is large but purification at this stage is not complete and it is necessary to provide purifiers to remove the greater portion of the sulphureted hydrogen.

Condensation First Step in Purification

It will be seen that condensation is the first step in the purification of the gas, and this begins in the hydraulic main or wash box, as the case may be. Unfortunately, in the removal of the heavy vapors, a certain amount of valuable enriching hydrocarbons are also removed. It follows that the most efficient condensation will minimize this loss and at the same time remove as completely as possible the undesirable constituents.

In water gas practice, the problem of condensation reduces itself to the elimination from the gas of as much of the tar vapors as possible, without leaving behind in the tar any of the high tension vapors that can be carried to the burners. To do this the gas should be cooled as gradually as possible and should pass into the purifiers at not less than 100 deg. Fahr. and through them without a drop in temperature.

It is usually customary in a water gas plant to place a scrubber immediately after the wash box or seal and in some cases follow this with a tubular condenser; in others the gas is passed directly into the relief holder. The wash box or seal box and scrubber remove the greater portion of the tar, but a considerable amount is carried forward into the relief holder to be more or less completely dropped there. The removal of the last traces of tar must be accomplished after leaving the relief holder. For this purpose shavings, sawdust and various kinds of washer scrubbers have been employed with varying degrees of success. The best practice seems to recognize fully the value of the relief holder as an efficient condenser as the conditions here are such as to permit a slow cooling of the gas. The full condenser surface of the relief holder should be utilized, as this delivers the gas to the purifiers at a more uniform temperature.

With reference to the amount of water to use in the scrubbing apparatus, the answers to the questionnaire gave amounts varying from one gallon per minute to as high as 300 gal. per minute. The majority of answers showed that the amount of water used was not known, and no accurate information as to the temperature of the water was available. These facts are mentioned to show how little attention has been given to this important matter and the need of a thorough study of scrubbing apparatus. The kind of scrubber and the effective scrubbing area per 1,000 cu. ft. of gas made will determine to a certain extent the amount of water to use. But some experiments need to be conducted to determine the effects of the use of too little or too much scrubbing water and the most suitable temperatures for the most efficient extraction of the tar with the removal of the least amount of the desirable hydrocarbons. Experimental work has been done to show that the gas must not be chilled too rapidly or there will be a loss of the higher hydrocarbons, and cold tar has a very much greater absorptive power for these valuable enriching hydrocarbons than hot tar. A good treatise on the Doherty washer cooler is given by L. E. Worthing in the proceedings of the American Gas Institute, Vol. VI, 1911, pp. 120-145. He claims for this system the advantage of short time contact between the gas and condensate and complete removal of the tar at compara-

*Paper read at Pacific Coast Gas Association convention.

tively high temperatures as soon as formed. Dr. A. P. Beardsly made a series of very carefully conducted tests on scrubbers, condensers, etc., and the results were reported by him in a paper before the New England Association of Gas Engineers, at the 1912 meeting, in Boston.

The number of cubic feet of scrubber content per 1,000 cu. ft. of gas per twenty-four hours seem to vary all the way from less than one cubic feet to more than three. It appears that two cubic feet of scrubber content for each 1,000 cu. ft. of water gas per twenty-four hours is ample. Small plants with large relief holders may reduce this, while large plants with comparatively small relief holders may find it necessary to increase this amount.

Circulating Water

The matter of the circulating water with its necessary evils of tar settling and cooling should receive the consideration of the gasman. The best practice is the use of the same water over and over again; therefore it is necessary to separate the tar from the water and cool the water. The best method of separation and the most suitable temperature for the separation is rather indefinite. The best results seem to be got when the mixture is brought to 140 to 160 deg. Fahr. and allowed to stand and cool. This requires large pots to give good results. There is a small proportion of emulsion of tar and water continually formed in the condensation and separation of the tar from the gas. This emulsion is hard to break up and we find that if the tar is allowed to accumulate for long periods that a further separation takes place between tar having low water content and the emulsion. A great portion of the emulsion is pumped with the water on its rounds again and again, each time breaking up more and more and dropping out while in the gravity separators. We have allowed our tar to accumulate for some time and have been pumping from the bottom of the tank and getting good tar most of the time. But at times we seem to strike a pocket of emulsion. This emulsion will not flow through the pipes to our boilers in sufficient quantities to burn, even though the water content be low enough. We have found that we can fire our boilers on a good load with tar that has as high as 40 per cent water. This was surprising to us but distillation tests were conducted showing as high as 42 per cent water in the tar taken from the burner line.

What the Summary Shows

Summarizing, it would appear that our condensing and cooling systems should operate so as to cool the gas as slowly as possible, but at the same time quickly enough that the condensate and gas will not be in contact too long. To this end some investigation needs to be done to determine the relative importance of the amounts of water used per 1,000 cu. ft. of gas and the scrubber capacity as well as the temperature drop that will secure the greatest efficiency.

Paper Read at Engineers' Meeting Valuable to Gas Men

"Heating Furnaces—Design and Practice" is the title of a paper given at the bi-monthly meeting of the steel works section of the Engineers Society of Western Pennsylvania, by C. M. Stein, an engineer of Paris, France. This paper, which is a valuable one to American engineers and gasmen in general, is outlined as follows:

Preliminaries—

Historical.

Origin and evaluation of gas furnaces.

General rules concerning gasification (dissociation equilibrium), combustion (molecular volume, specific heat, calorific power, temperature of combustion), heat transmission (contact, radiation conductivity).

Furnace Design—

Section of heating.

Gas, pulverized coal, oil.

Selection of furnace system.

Internal shape (direct or muffled heating, fixed or mobile laboratory and hearth, single or double hearth), external shape, recuperative or regenerative chambers.

Furnace Calculation—

Data (given and assumed), combustion (calorific power and output of gas, quantity of air, composition and quantity of burnt gases, practical temperature of combustion), hearth dimensions (heat absorbed by contact radiation and conductivity, heat to be furnished, time of heating number of pieces to be heated), fuel consumption (calories spent in the laboratory per hour of heating and radiation, and per pound of coal ratio of consumption to production); laboratory sections (sections of air and gas inlets and burnt gases outlets, height of the roof and influence of the friction); recuperation of chambers (height to furnish the burner pressure and overcome the chamber resistance, horizontal section according to the weight of bricks for regenerative system and to the heating surface for recuperative system; gas producer (difference of level between hearth and grate, or blowing pressure); chimney (top section suitable to the speed and output of flue gases, height to give the necessary draft).

Result of Calculation—

Harmony and interdependence of the different dimensions; modification of an American open-hearth furnace.

Practice—

Principal dispositions.

Burners; combustion chamber; rational circulation of the flames; independence in the erection.

Masonry—

Selection of bricks and mortar; thickness of the walls.

Jacket and buckstays.

Cooling devices.

Gasmen wishing a copy of the paper outlined above should apply to the secretary of the Engineers Society of Western Pennsylvania, Union Arcade Building, Pittsburgh, Pa.

Public Utilities Securities Market Report

Prices of Representative Gas Bonds

(Quotations furnished by The National City Company)

Company	Issue	Maturity	Oct. 27, 1921 Bid	Asked
American Lt. & Trac. Co.	Five Year 6s	May 1, 1925	92	93
Brooklyn Union Gas Co.	First Consol. 5s	May 1, 1945	84	85
Columbia Gas & Elec. Co.	First 5s	May 1, 1945	86½	88
Consol. Gas, Elec. Lt. & Pr. Co. of Baltimore	First Ref. 7½s	Dec. 1, 1945	99¾	101
Consol. Gas, Elec. Lt. & Pr. Co.	General 4½s	Feb. 14, 1935	77	78
Consol. Gas Co. of New York	Sec. Conv. 7s	Feb. 1, 1925	102¾	103
Consol. Gas Co. of New York	One Year Sec. 8s	Dec. 1, 1921	100	100¼
New Amsterdam Gas Co.	First Consol. 5s	Jan. 1, 1948	71	73
Denver Gas & Elec. Co.	Gen. (now 1st) 5s	May 1, 1949	78	80
Detroit City Gas Co.	Gold 5s	Jan. 1, 1923	93	95
Equitable Illum. Gas Lt. Co. of Philadelphia	First 5s	Jan. 1, 1928	97	99
Hudson County Gas Co.	First 5s	Nov. 1, 1949	74	77
Laclede Gas Light Co.	Ref. & Ext. 5s	Apr. 1, 1943	87	89½
Louisville Gas & Elec. Co.	First & Ref. 7s	June 1, 1923	97	99
Michigan Light Co.	First & Ref. 5s	Mar. 1, 1946	71½	73
Milwaukee Gas Light Co.	First 4s	May 1, 1927	82¼	84
Pacific Gas & Elec. Co.	Gen. & Ref. 5s	Jan. 1, 1942	82¼	82¾
Pacific Gas & Elec. Co.	Col. Tr. Conv. 7s	May 1, 1925	98½	100
Pacific Gas & Elec. Co.	First & Ref. 7s	Dec. 1, 1940	100	101
Cal. Gas & Elec. Corp.	Unif. & Ref. 5s	Nov. 1, 1937	89¼	91
Peoples' Gas Lt. & Coke Co.	Refunding 5s	Sept. 1, 1947	77¼	78
Chicago Gas Lt. & Coke Co.	First 5s	July 1, 1937	81½	83
Portland Gas & Coke Co.	First & Ref. 5s	Jan. 1, 1940	81	83
Seattle Lighting Co.	Refunding 5s	Oct. 1, 1949	68	70½
Southern California Gas Co.	First 6s	Nov. 1, 1950	86	89
United Gas Improvement Co.	Two Year 8s	Feb. 1, 1923	99¾	100¼
Utica Gas & Electric Co.	Ref. & Ext. 5s	July 1, 1957	78¾	81
Washington Gas Light Co.	General 5s	Nov. 1, 1960	82	83
Western States Gas & Elec. Co. of California	First & Ref. 5s	June 1, 1941	77	81

Earnings Not Up to Estimates

Chicago, Ill.—Indications are that earnings by Peoples Gas Light & Coke Company this year will not be up to earlier estimates of $10 a share on 385,000 shares outstanding. This is due in large part to the fact that gas sales are not up to the estimated consumption of 30,000,000,000 cu. ft. of gas. Outlook now is the company will not sell more than 27,000,000,000 cu. ft. of gas. Difference in amount of sale would mean slightly more than $3,000,000 in gross revenue.

Dividend Reduced

Boston, Mass.—Trustees of the Massachusetts Gas Company have voted to pay a dividend of 1¼ per cent on the common shares, payable Nov. 1. This is a quarterly dividend at the rate of 5 per cent per annum, which is the rate the trustees expects to continue until improved conditions justify an increase. This dividend makes 6½ per cent paid on the common shares for the current year. For four years Massachusetts Gas common has been on a 7 per cent dividend basis.

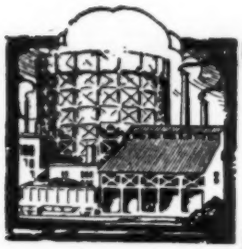
The news that the dividend had been reduced from 7 to 5 per cent resulted in a 4-point recovery for the issue in trading on the Boston Stock Exchange. It had been felt in some quarters, when the directors postponed dividend action a while ago, that the payment would either be deferred or passed. At the present price of the stock and a 5 per cent dividend rate the income yield on the purchase price is about 8.33 per cent. The senior issue, however, was off a half-point on the news.

Atlanta Gas Earnings for September

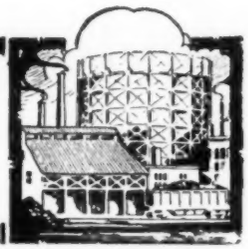
Atlanta, Ga.—September earnings of the Atlanta Gas Light Company were $34,882, as compared with $38,712 for August, according to the company's monthly report issued the latter part of October. Net earnings of the company for the twelve months from Oct. 1, 1920, to Sept. 30, 1921, were $279,145.35, which is only 6.16 per cent per year on the minimum valuation fixed by the State railroad commission. On the fair valuation of the properties fixed by H. E. Riggs, an independent engineer, last December the net earnings for the year amount to only 3.71 per cent.

Total revenue from the sale of gas during September was $167,725.03, and from other sources $2,215.46. Operating and manufacturing expenses were $129,729.27, with $5,328.99 going into the maintenance reserve. This left net earnings for the month amounting to $34,882.23.

This statement is the final monthly and annual report of the gas company filed with the Georgia State Railroad Commission prior to the hearing that is scheduled to come up in the near future in which the gas company is required to show why its Atlanta rates should not be reduced.



NEWS OF THE GAS INDUSTRY



Malden G. & E. Companies' High Rating

Malden, Mass.—At a recent inspection made of all the Tenney Company's works and offices throughout their system the Malden Electric Company has been rated first among their electric companies and the Malden & Melrose Gas Light Company, has been rated first among their gas companies.

This is indeed a great credit to Malden and the employees are all proud of this decision that has recently been announced. The following high rated companies are Concord, Haverhill and Fitchburg. This inspection included the offices, appliance stores, works office, stock room, meter room, power house, garage, buildings, gas works, tar plant, club room, substations, laboratories, men's rooms, linemen's rooms and machine shops.

Making Coke from Pitch Residue

Birmingham, Ala.—Making pitch coke out of the residue of the by-product ovens after its original coke output has been consumed and coal-tar products have been extracted is the latest and newest industry in Birmingham. The Barrett Company, of Fairfield, Ala., manufacturers of coal-tar products, is converting its pitch residue into coke. The company has been experimenting on this product for several years and the venture has been developed into a successful enterprise. More than 100 beehive ovens are now in use and the coke is said to be eminently satisfactory. The Barrett Company is the largest producer of tar products in the world.

Plan Consolidation of L. I. Light Companies

Albany, N. Y.—Joint application has been made to the Public Service Commission by the Long Island Lighting Company, of Northport; the Consumers Gas Company, of Riverhead, and the Southold Lighting Company for approval of the sale and transfer of the property and other assets of the Consumers and Southold companies to the Long Island Lighting Company and for authority to the Long Island Lighting Company to issue $25,000 in common stock, $65,000 in preferred stock, and $71,500 in first mortgage 5 per cent bonds.

It is stated in the application that $71,640 is to be used in building twenty-eight miles of distribution line in Southold Township, erect street lamps and provide service for prospective consumers of gas and electricity. It was also stated that the consolidation will eliminate intercorporate charges and permit a larger production at the main plants of the Long Island company, thereby bringing about the production and distribution of gas and electricity at the minimum cost consistent with good service. The proceeds of the stock and bonds proposed to be issued are to be used in part for taking over the two companies.

Gas Company Assessments Increased

Nashville, Tenn.—Assessments of railroads and public utilities in Tennessee for 1921-1922 were reduced $5,788,903 as compared with assessments for 1919-1920, according to figures certified here to the State Board of Equalization by the Tennessee Railroad and Public Utilities Commission. The total assessment of gas companies in the States for 1921-1922 amounts to $14,774,337. Some of the notable changes as compared with the 1920 assessment are the Nashville Railway & Light Company, increased $500,000, and the Memphis Gas & Electric Company, increased more than $1,000,000. The decreases were nearly all noted in railroad companies. The Knoxville Gas Company increase amounted to about $25,000.

May Erect Artificial Gas Plant

Jamestown, N. Y.—As a result of a recent conference of city officials and others interested in Jamestown's gas supply, the city is to furnish information to engineers of the General Oil & Gas Corporation, manufacturers of artificial gas plant apparatus, from which facts and figures which will prove of value to Jamestown should it decide to erect an artificial plant here in the future, will be compiled.

The plan of erecting such an artificial gas plant was outlined by United States District Attorney Stephen T. Lockwood, of Buffalo, representing the corporation and questions were answered as to engineering features by H. G. M. Fisher, an engineer of the company. Mr. Lockwood stated that the actual cost to Jamestown of erecting such a plant would be a million and a quarter dollars and assured those present that the city would be supplied at all times of the year with an adequate supply of gas for both heating and lighting purposes.

The cost of the apparatus would be $840,000, while the compressing machinery would cost an additional $410,000, the Buffalo attorney said. The present pipe lines of the Pennsylvania Gas Company if they were purchased might be used to transmit the gas to all parts of the city and to Falconer, he added.

The difference in heat qualities of natural and artificial gas was discussed by Mr. Fisher, the engineer who said that the present peak load in Jamestown, according to figures of the Pennsylvania Gas Company, is 7,500,000 cu. ft. per day, while with the artificial gas it would require 15,000,000 cu. ft. A thirty-five-pound pressure would be assured, said the gas-plant men.

It was suggested that if the city contemplated installing such a system a leakage survey of the pipes now laid be made.

Bankers Inspect Properties of Philadelphia Company

Pittsburgh, Pa.—An all-day inspection of the properties of the Philadelphia Company was made on Saturday, Oct. 22, by more than 100 bankers of Chicago, Boston and New York, including the firms of Hayden Stone & Co., Ladenburg Thalmann & Co. and Chase Securities Company, of New York, and Lee, Higginson & Co., of Boston.

The purpose of the bankers' visit to Pittsburgh was in connection with the completing of arrangements for the sale of $16,000,000 first refunding collateral 6 per cent gold bonds of the Philadelphia Company to liquidate the floating debt and provide for improvements planned to perfect the service of the company.

The bankers were joined by a large number of Pittsburgh bank officers and Philadelphia Company officials. The program for the day was started when the group left the Philadelphia Company building at 9 A. M. in automobiles, driving to the Brunot's Island power plant of the Duquesne Light Company. After inspecting this plant, they crossed the Ohio River to the reserve holders station of the Allegheny Heating Company, which at the time of their erection were the largest in the world. The party then drove through the downtown business section and an opportunity afforded the visitors to see the Pittsburgh banking district, then by way of Bigelow Boulevard to the Craft Avenue car barns of the Pittsburgh Railways Company, then through Schenely Park to afford a view of the Monongahela River Valley steel plants, to the new outdoor substation of the Duquesne Light Company at Dravosburg, Pa. Following the inspection of the station, the drive to Elrama, Pa., was made to examine the manufactured gas plant of the Euqitable Gas Company.

Following luncheon at McKeesport, Pa., the party was taken to see the Colfax, Pa., power plant on the Allegheny River. This is the new power plant operated by the Duquesne Light Company. An inspection of the Equitable Coal & Coke Company was also made at Colfax and the return trip to Pittsburgh made in time to attend a dinner given by A. W. Thompson at the Duquesne Club. The bankers left for Chicago, Boston and New York Saturday evening.

The new issue of bonds will make possible the favorable refunding of $9,700,000 which falls due in the spring. The new financial arrangement will place the Philadelphia Company in a strong position with respect to its financing as the floating issues may be cared for, and it is said that no refunding will be necessary within the next twenty-two years. This present financing completes a program, conducted at this time because of very favorable condition of the bond market, that has allowed the Philadelphia Company $69,000,000 during the past thirty months to be used for the refunding of maturing issues of securities and for the betterment of service.

To Stop Monthly Report

Indiana State Capitol.—The Public Service Commission authorized the Citizens Gas Company to discontinue the submission of monthly reports to the commission, as provided in the order establishing the 90-cent gas rate. The company was instructed in the new orders to report to the commission quarterly.

The reports which have been submitted to the commission under the old order contained information concerning the coke sales and reserve of the company.

The Indianapolis Gas Company was authorized by the commission to issue to the Citizens company $160,000 of 5 per cent gold bonds. The securities are to be sold to the Citizens company at not less than 80 per cent of par value.

To Freeze Out Gasoline

Oil City, Pa.—The gas that will pass through the proposed line from Byron to Powell that is to be built by the Ohio Oil Company will be treated for its gasoline content in the plant of the Powell Gas & Electric Company, which firm has one of the few refrigeration gasoline plants operating in this country.

The gasoline is frozen out of the gas instead of being compressed out of it or absorbed as in the other methods employed.

Stockholders Hear Pacific Gas & Electric Report

Modesto, Cal.—Facts and figures concerning the management of the Pacific Gas & Electric Company, its present activities and future developments, were told over 200 stockholders of the company at an open meeting held at Modesto last week.

The principal speakers of the evening were: President W. E. Creed, General Manager John A. Briton and Treasurer A. F. Hockenbeamer.

Britton addressed himself to the questions, "What is the company doing?" and "Why is it doing it?" He went on to say the territory covered by the company's operations covered an area of 42,000 square miles, and at present has over 579,000 consumers. Ten years ago the company had connected to their system approximately 285,000 horse-power of electricity. To-day, he said, they have nearly one million horse-power connected.

Hockenbeamer furnished information concerning the financial matters of the company. He said the gross earnings of this year were approximately $38,000,000. The net earnings of the company being nearly a million and a half. During the last five years over $45,000,000 has been invested in new plants to keep up the growth of the business. New money was constantly needed for extensions and that was the reason the company constantly offered new securities.

President Creed spoke in part: "This meeting marks a pioneer movement in corporate management. The Pacific Gas & Electric Company is holding a series of meetings of its stockholders in various sections of the State for the purpose of acquainting them directly with the condition and progress of the company and its function in the development of the State and in service to its people.

Gasoline from Shale

Shale from Debeque, Col., has given up gasoline. The color was akin to the garnet, but there was no effort made to refine it, the distillation being done by the crudest methods possible.

The Industrial Process Engineering Company, of St. Louis, who made the tests with the "red gasoline," says that 22.8 miles per gallon were obtained, the car used being a large one. Other tests showed that there are about 45 gal. of oil from each ton of shale and that 42 per cent is gasoline, which is about twice that obtainable from other crude oils. The present writer believes that it will be well for those interested to watch for further statements. He is neither an optimist nor a pessimist, hence it is let us see more ere we judge too strongly either way.

Tariff for Increase Filed by Natural Gas Company

Harrisburg, Pa.—A new tariff has been filed with the commission by the Peoples Natural Gas Company, of Pittsburgh, Pa., calling for an increase in the natural gas rate, effective Nov 15, for territory served by the Peoples Natural Gas Company, including Pittsburgh, all cities, towns and villages served west of and including Derry, Pa., and Blairsville, Pa., and all territory north of Derry. The increase is from 47 cents to 53 cents gross, with a three-cent discount per 1,000 cu. ft., instead of two cents, for prompt payment.

The rate for slot meter service increases from 47 cents gross per 1,000 cu. ft. to 25 cents for 450 cu. ft. The rate to churches and charitable institutions is increased from 45 cents gross to 48 cents per thousand cubic feet subject to a three-cent discount.

The industrial rate for surplus gas is not increased and is continued at 47 cents gross per 1,000 cu. ft., with a two-cent discount.

The same tariff is to apply in New Florence, Bolivar and Ligonier, Pa., and other territory east of Derry and west of Johnstown except the rate to churches and charitable institutions, which is 50 cents per thousand with a three-cent discount. The rate to the Johnstown Fuel Supply Company, at Johnstown, is 40 cents per thousand cubic feet.

Adds Large Gas Plant

Chicago, Ill.—The Peoples Gas Light & Coke Company is about to put into operation a new and most modern gas and coke plant which represents investment of some $18,000,000, but which is counted upon to pay its way easily and to meet the increasing demands for gas.

Will Sell Note

Washington, D. C.—The Public Utilities Commission of the District of Columbia has authorized the Washington Gas Light Company to issue and sell $370,000 7½ per cent five-year gold notes. Proceeds are to be used to reimburse the treasury for expenditures made in the acquisition of additional property, extensions, improvements, etc. The notes will be dated Jan. 1, 1921.

Gas Engineer Returns from Abroad

Baltimore, Md.—Spencer A. Covell, gas engineer for the Public Service Commission, has just returned from England, where he was sent last summer to make an exhaustive examination into the methods of the British gas companies and to inquire particularly into the heating value standards in effect there.

Before going to England he spent some time in Canada, visiting Ottawa, Quebec, Montreal and Toronto, going thence to London, Croydon, Birmingham, Liverpool, Manchester, Sheffield, Nuneaton, Oldham, Middlesborough and Glasgow.

Much discussion has taken place before the Public Service Commission as to the value of gas at varying heating standards, the gas company claiming that a gas of low heating value within certain limits was as good and economical as gas at higher standards. Mr. Covell found in England what recently has been developed in Baltimore—that uniformity in the quality of gas was of more importance than high heating values, and that it was essential to good service to have gas of a uniform heating value.

This was shown by the experience of the Consolidated when it reduced the standard from 550 to 500 B.t.u. The reduction was followed by a howl from gas users all over the city, which was not quieted until the company had sent men to nearly every house in Baltimore to adjust gas appliances. Since then complaints have fallen off.

In commenting on the situation Chairman Malloy, of the Public Service Commission, said that under no circumstances would the company be allowed to make any change in the heating value of its gas, either to a higher or lower standard, unless it is prepared to immediately readjust every gas appliance in the city.

Mr. Covell found that the standard throughout Canada is 450 B.t.u., while there are varying standards throughout England, depending upon the desires of the individual companies.

The companies are closely supervised, Mr. Covell said, by city, county or Government authorities, to see that the standard is maintained.

The average heating value of gas in England is about 475 B.t.u. Prior to the war it was about 550. The lowest heating value of gas in any city visited, Mr. Covell said, was 260.

On a large part of his trip Mr. Covell was accompanied by A. L. Phillips, of New York, engineer for the American Gas Association, of which the Consolidated is a member. Mr. Phillips was sent to make an examination similar to that made by Mr. Covell.

Mr. Covell is getting his data in shape for submission to the commission for use at the hearing of the gas company's application for a permanent rate of $1.15. It is expected that the commission will set the date for the hearing about Nov. 15.

Rate Reduction

Providence, R. I.—A new schedule providing for a cut of 10 cents per thousand cubic feet to domestic consumers of gas has been filed with the Public Utilities Commission by the Blackstone Valley Gas & Electric Company. The corporation promises further reduction and a readjustment of rates if conditions make it possible. The new schedule provides $1.30 net for the first 1,000 cu. ft. per month, $1.20 net for the next 20,000 cu. ft. and $1.10 net for all over 20,000 cu. ft.

The reduction in the gas rate, while appreciated, will, however, have no effect on the demand of 8,000 local gas company patrons for the mayor's gas committee to go ahead with its investigation of the service charge. The special committee will meet this week to discuss the details of the investigation.

Renewing Service Pipes

Bridgeton, N. Y.—The Bridgeton Gas Company has a gang of men at work on North Pearl Street, in the charge of L. G. Watson, renewing all service pipes and looking after the underground mains on account of the new pavement which is to be laid there. The company has done a great amount of work this year.

Change Name of Firm

Fairmont, W. Va.—Under authority granted by the Secretary of State, the name of the Ryan Coal Company has been changed to the Clarksburg Gas & Coal Company, and hereafter the general office of this company will be at Wheeling instead of Fairmont.

Gas to Be Installed

Duluth, Minn.—A resolution ordering gas connections on Tenth Street from Twenty-second to Twenty-third Avenues West was adopted by city commissioner.

Gas Earnings Grow

San Francisco, Cal.—Southern California Gas Company earned interest on its first mortgage and collateral trust mortgage bonds more than three times during September, and 2.2 times for the twelve months ended September 30.

These facts are shown in its statement of earnings and expenses made public by Girvin & Miller, Inc., who are offering the convertible collateral trust 8 per cent bonds of the Southern California Gas Company.

During September, gross earnings for the utility were $404,443. Net earnings of $83,518 for the month are shown after operating expenses, maintenance and taxes, totaling $320,925.

The balance for the month was $55,792, after deducting from net earnings the sume of $27,726 for interest on the first and collateral trust mortgage bonds.

The statement for the twelve month period follows:

Gross earnings	$3,870,503
Operation, maintenance and taxes	3,188,979
Net earnings	$ 681,524
First and collateral trust mortgage bond interest.	305 194
Balance	$ 376,330

Customer Ownership

Kenosha, Ill.—During the last three years more than $100,000,000 in additional capital has been secured by American corporations by the sale of stock to employees and customers. Public utility corporations have been the active leaders in development of this plan. They have been particularly anxious to distribute their securities among their customers. The movement is termed ownership by them and the idea is advanced that a large development of this nature would do much to bring the public utility and the public into more friendly relations. It would be public ownership with a private management, a form of co-operation that ought to help in the establishment of a better understanding between interests that have been far too much inclined to indulge in war in the past.

Roger Babson, who is much of an analyst of business affairs, points out that complaints of utility service come from those who use it. Obviously, if those who use it were interested in ownership and held part of the securities they would contemplate the question of mutual relations and service from another viewpoint. Possibly in the change of viewpoint much of the tendency to complain might disappear. The participation of the public in ownership of large corporations is sound. If all the people able to invest $100 or more had a share or more in the public service corporations in Kenosha, there would be little trouble in establishing harmonious relations that would be to the advantage and comfort of all parties. If it were possible to develop this idea rapidly it would help solve many problems that now vex and annoy the public.

Public Ownership of Utilities

"The ownership of the utilities of the nation constitute the greatest public ownership group the world has ever known," says Charles A. Monroe, president of the American Gas Association, in asking Wisconsin executives of gas companies to be prepared to discuss customer-ownership at the national convention of the association in Chicago, Nov. 7 to 12. Nearly every gas company in Wisconsin will send representatives to the convention, because many of them are now engaged in selling their stock to the public.

Standard Gas Earnings

For the twelve months ended Aug. 31, the Standard Gas & Electric Company and subsidiary companies reported net earnings of $11,743,041, compared with $10,907,873 in the corresponding period a year ago. Gross earnings were $33,359,697, against $28,858,907. Gross revenue amounted to $34,734,254, against $30,297,819.

Permitted to Issue Bonds

San Francisco, Cal.—Pacific Gas & Electric Company has been given authority by the Railroad Commission to issue $4,853,000 face value of its general and refunding mortgage gold bands and to deposit and pledge these bonds with the Mercantile Trust Company, of San Francisco, in accordance with the provisions of appliant's first and refunding mortgage dated Dec. 1, 1920. None of these bonds are to be sold to the public. The purpose of the pledge being to give additional security to the bonds of the first and refunding mortgage.

Industrial Waste Caused by Poor Lights

Washington, D. C.—Poor and faulty illumination is the cause of great waste in the majority of industrial plants in the United State, says the Committee on Elimination of Waste and Industry, in its report dealing with accidents due to eye defects.

"The eye is involved in 10.6 per cent of all permanently disabling accidents," says the report. "One estimate places the loss due to faulty conditions, above the entire cast of illumination.

"In 446 plants investigated, only 8.7 per cent were found to be in excellent condition, the other ratings being: Good, 32 per cent; fair 29.1 per cent; poor, 18.8 per cent; very poor, 3.5 per cent; partly good, partly poor, 7.8 per cent."

Gas Sales

Philadelphia, Pa.—Sales of gas in Philadelphia by United Gas Improvement Company through its subsidiary, the Equitable Illuminating Gas Light Company, in the three months ended Sept. 30, 1921, totaled 3,172,832,710 ft. This compares with 3,825,330,100 in the preceding quarter and 3,250,162,940 a year ago. Amount of money which will be paid to city on Oct. 30 is $818,967.

Portland (Me.) Gas Rate Is Reduced

Portland, Me.—At a meeting of the directors of the Portland Gas Light Company held Oct. 17, after a careful consideration of the income and expense of the company, it was decided to reduce the price of gas by 10 cents per thousand cubic fet to take effect Dec. 1 next. This was a tentative step towards further reduction, should conditions justify them, as it is hoped may be the case.

This action is, of course, as all actions in connection with the rates, to be subject to the approval of the Public Utilities Commission.

Pumpkin Starts Blaze

Laurel, Del.—A pumpkin displayed in a show window of the Eastern Shore Gas & Electric Company's office here, dropped from its pedestal and fell on several lights breaking them and causing a short-circuit, which started a blaze.

Prompt work by the fire department confined the blaze to the office.

Announcement

The pulverized fuel department of the Quigley Furnace Specialties Company, of 26 Cortlandt Street, New York City, has been acquired by the Hardinge Company, 120 Broadway, New York.

The Hardinge Company states there will be no change in the method of conducting the business at their offices, as the organization of the Quigley engineering department has been taken over practically intact.

The experience and manufacturing facilities of the Hardinge Company enables them, with their present equipment and augmented staff, to further extend the activities of the Quigley pulverized fuel system.

The Quigley Furnace Specialties Company states that this transfer will in no way affect their refractory specialties business, which includes the manufacture and sale of Hytempite (high temperature cement), Insulbrix (insulating refractory brick), and Insuline products.

The rapid growth of this branch of their business has made it necessary for them to devote their entire attention to furnace specialties, with particular reference to refractory linings and the heat insulation of furnace structures.

Public Utility Issues Improve

Increased firmness developed in the market for public utility securities last week and some further noteworthy gains were noted. American Light & Traction and American Gas & Electric were the strongest features. One day the former moved up 3 points to 96 and the latter 5 points to 108. These are the highest quotations so far established on the current upward movement.

Trading in stocks was not active. In this connection, attention should be called to the fact that offerings are on a smaller scale than for some time.

Bonds were strong with a good demand for all the prominent issues. Ohio Power 7s sold up to 96 and the new Philadelphia Company bonds were active and went up to 87¼.

Claims Meter Record

Louisville, Ky.—There are a Babe Ruth, Jock Hutchinson and Jack Dempsey, but now John M. Rawley comes into the ranks.

Mr. Rawley's average is 123,436 to one error. He is the champion meter reader of the world, officials of the Louisville Gas & Electric Company declare. The figures, they contend, are absolute. Mr. Rawley has faced 370,308 dials and misread one. There are three dials on a meter. The record dates back from Dec. 1, 1919.

Mr. Rawley walks, he estimates, from a dozen to sixteen miles each day, and at least one mile "high." The altitude comes from garret and cellar steps which he climbs and descends.

Printer's Carelessness Causes Errors

Owing to the carelessness of the printer, several errors appeared in the article by Thomson King which was published in the Oct. 22 issue of the AMERICAN GAS JOURNAL. In the table of contents "business" was substituted for the word "burners." On page 363, the last item in the table of multipliers to convert gas flow at 0.6 gravity to flow at other gravities, 0.10 is given instead of 1.00, and in the heading for the table below the word "pounds" pressure was used when it should have been "inches." These items were corrected on the galley proof but were not followed by the printer.

Commission to Settle Gas Dispute

Napoleon, Ohio.—A committee of business men and officials of the Ohio Gas Light & Coke Company met with the city council and requested that the gas ordinance passed recently fixing the price of gas at $1.50, be rescinded. Council refused to comply with the request. The old gas rate of $2.30 per thousand cubic feet expires Nov. 1. The gas company has taken the matter up with the State Utilities Commission.

Stockholders to Meet

Waterbury, Conn.—A special meeting of the stockholders of the Waterbury Gas Light Company will be held in the board room of the company, corner of Centre and Leavenworth Streets, in Waterbury, on Wednesday, Nov. 30, for the purpose of considering and acting upon a proposition to increase the stock of this company from $2,000,000 to $2,200,000.

Issue Bonds

Harvey Fisk & Sons have issued a circular on Denver Gas & Electric Light Company first and refunding sinking fund 5 per cent bonds. The issue is a legal investment for savings banks in Maine, New Hampshire and Rhode Island.

"Uncle Joe" Cannon Is No Pessimist

Chicago, Ill.—"Uncle Joe" Cannon, 85-year-old youngster of the House of Representatives, laughs at pessimists who are worried over business recovery.

"Americans to-day, in the rush for the almighty dollar, forget the blessings they enjoy," said the veteran of a hundred political battles.

"Why, back in Danville, long years ago, before the days of gas and electric lights, the telephone, electric railways and other marvelous inventions that have brought comforts to the people, the folks of the town opened their eyes in amazement at the sight of an oil lamp in a store window.

"Just look back at those days. Well do I remember when the people thronged down the main street to see the first kerosene lamp burning in that shop window. It was in the days of the tallow dip candle. When gas lighting came the people scoffed at this marvel, just as some do to-day in discussing the wonderful utility services of this day.

"Now, see what we enjoy to-day, in life's comforts and conveniences. Look at the revolutionary changes gas and electricity and the other public utility services have wrought. These are the happy days, but so few of us realize it.

"The 'Gloomy Gus' of business must wake up to the big future ahead. Most prosperous, most resourceful of all nations, the citizens of these United States are blind to the many advantages for which they should be thankful."

New Natural Gas Field in Alabama

Dothan, Ala.—Natural gas in paying quantity is reported to have been discovered in the eastern part of Dothan County, Ala., on what is known as the McNair plantation, twenty miles east of this city. Tests of the gas have been made by the State geologist, and it is reported to be of excellent quality and in sufficient quantity to make its piping a worth-while commercial venture.

Carbon Black Production Is Causing Gas Shortage

Frankfort, Ky.—Kentucky cities which depend upon natural gas for lighting and heating purposes are facing the prospect within a few years of having to go back to coal entirely for heating and artificial gas or electricity for lighting unless something is done to prevent manufacturers of carbon black entering the Kentucky gas field promiscuously, declares Dr. W. A. Jillson, director of the Kentucky Geological Survey. There are a number of carbon black factories in eastern Kentucky and several others have been projected,, Dr. Jillson says.

Carbon black is used for printers' ink, being the only successful substance for inks for high-speed presses, automobile tires, and various other uses.

Companies which supply cities with natural gas must be assured of a certain amount of gas for a certain number of years to make the project feasible, and for this reason Dr. Jillson considers carbon black factories in the heart of gas fields undesirable.

The United States Geological Survey, in a bulletin just received by Dr. Jillson, puts the number of carbon black plants in the country in 1919 at thirty-six, and in 1920 thirty-nine. The output in 1919 was 52,056,941 pounds, worth $3,816,040, and in 1920 was 15,321,892 pounds, worth $1,032,286. Forty-five per cent of the output was used for automobile tires, 23 per cent for printers' ink, 18 per cent exported and 14 per cent for miscellaneous uses.

During the war the demand for carbon black for military purposes acted as a stimulus for the business, which accounts for its present size, Dr. Jillson says. It also has resulted in the development of some of the most remote gas fields, such as the Monroe field in Louisiana. Dr. Jillson adds here that the remote fields were a proper base of operation for carbon black manufacturers, and that in his opinion it was desirable from a commercial standpoint that they be permitted to develop these fields.

In some States the operations of carbo black manufacturers have been limitd by law, and in some of the Kentucky fields gas well owners have combined to prevent them getting a footing.

Personal Notes

HENRY G. MORRIS has been appointed by Secretary Hoover to head the new fuel division of the Bureau of Foreign and Domestic Commerce. Mr. Morris is a graduate of Massachusetts Institute of Technology and has been employed by the Government since 1917.

LEWIS A. MACARTHUR, general manager of the Pacific Power & Light Company, Portland, Ore., has received the honorary degree of master of arts in public service from the University of Oregon.

CARL K. CHAPIN, formerly general manager of the Brady Utility Company, Memphis, Tenn., is now located at Pasadena, Cal., as the Southwestern editorial representative of the *Journal of Electricity and Western Industry*.

A. W. THOMPSON, president, Philadelphia Company, is to be the speaker at the first fall meeting of the Historical Society of Western Pennsylvania. At this meeting, the early history of the street railways in Pittsburgh will be discussed.

VIC HOGAN, of the General Electric, Lynn, Mass., was in the line-up of the gas and electric team at Franklin Field last week against the Vikings. The Lynn team had all the better of the contest and won 6 to 1.

JOHN T. TRINITY, forty years superintendent of the outside construction of the People's Gas Light Company, died on Oct. 15 at Manchester, N. H. He was a native of England and lived in Manchester fifty-two years. He leaves two daughter, two sisters and three brothers.

GEORGE F. HOWLAND, treasurer of the company, and Philip M. Childs have been elected trustees of the Massachusetts Lighting Companies.

WILLIAM A. CLARKE, who died on Oct. 19, at the Lynn Hospital, after a long illness, was prominent in Massachusetts business and politics for many years and was associated with the Boston Finance Corporation, 31 State Street. He was born in Newark, N. J., June 9, 1852, and educated at Buckland and Northampton. He moved to Lynn twenty-two years ago and engaged in the jewelry business. He served in the Legislature in 1885 and 1887 as clerk of the House Committee on Street Railways, Harbor and Public Works, and became interested in the possibilities for development of the State's water-power resources. He was president of the first company which obtained a charter to construct the Cape Cod Canal. He later promoted and financed electric light and gas power plants at Wakefield, Nantucket, Woburn and other places, and established municipal water works in several other places.

JOHN JENNINGS, an employee of the Clinton Gas Light Company, and Miss Margaret Walsh, daughter of Mrs. Edward Walsh, of 12 James Street, were united in marriage in Our Lady of the Rosary church by Reverend Edward J. Fitzgerald, pastor. Mr. Jennings attended the Clinton Schools, and is a World-War veteran, having served in France for over a year with an infantry unit.

WALTER H. RAY, JR., who has been associated with the Turners Falls Power & Electric Company, Turners Falls, Mass., for eight years, has been elected secretary of the Turners Falls Board of Trade, as successor to his father, the late Walter H. Ray, Sr. He is thirty-five years old, and a graduate of the Worcester Polytechnic Institute.

THE AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS recently announced the appointment of F. Paul Anderson, dean of the College of Engineering, University of Kentucky, as director of the society's research laboratory. Dean Anderson will fill the place vacated by the death of Dean John R. Allen, October, 1920.

COUNTIES GAS & ELECTRIC COMPANY has completed its customer stock ownership campaign, having sold an issue of $1,080,000 8 per cent preferred stock. The new stock was first taken in part by present shareholders, then the employees, who subscribed 100 per cent, and then the customers, through employee salesmen. The customer ownership campaign opened Oct. 1

THE FALL RIVER GAS WORKS COMPANY has declared a $3 quarterly dividend payable Nov. 1, to stockholders of record Oct. 15, 1921.

Developments in Buffalo Gas Situation

Buffalo, N. Y.—With the Public Service Commission investigating local gas conditions, the Iroquois Natural Gas Company demanding a higher rate to mix manufactured gas with its natural gas and the city starting a rate case to have the price of artificial gas reduced, the citizens and consumers who have not followed the situation closely, find it difficult to distinguish one development from the other.

A short time ago Commissioner William R. Pooley, chairman of the up-State Public Service Commission, held an enquiry into the natural gas supply here for the coming winter and to see what could be done to relieve the natural gas shortage. President B. C. Oliphant, of the Iroquois Natural Gas Company, told the commissioner that it was impossible to obtain any additional supply of natural gas.

He averaged the daily winter needs of Buffalo and district at 47,000,000 cu. ft. The natural gas supply, he said, would average less than 30,000,000 cu. ft. a day, a shortage of 17,000,000 cu. ft. a day. His plan to augment the 30,000,000 cu. ft. of natural gas was to mix artificial or what is known as manufactured gas with natural gas.

A supply of 10,000,000 cu. ft. of manufactured gas, he estimated, could be obtained as follows: 6,000,000 cu. ft. per day from the Donner Steel Company, 1,500 000 cu. ft. per day from the old Genesee Street plant and to take over the old W. J. Judge plant at the foot of Genesee Street which can produce 3,500,000 cu. ft. per day. These 10,000,000 cu. ft. of manufactured gas mixed with the daily supply of 30,000,000 cu. ft. of natural gas would make a total supply of 40,000,000 cu. ft. per day, about 7,000,000 cu. ft. short of the average required daily supply.

The Niagara Gas Corporation, having turned over its Genesee Street plant to the Iroquois people, is to serve its 23,000 artificial customers with manufactured gas purchased from the Semet-Solvay Company.

The Iroquois Natural Gas Company's present rate is 40, 50 and 60 cents, minus the usual discount, which it claims averages 45 cents a thousand cubic feet to the company. To obtain this additional 10,000,000 cu. ft. of manufactured gas President Oliphant claims will cost him 46 cents a thousand cubic feet to put into the holders before mixing. To pay this price and distribute it through the natural gas mains, it would cost more than the company is receiving for natural gas, he claims

Last week before Commissioner Pooley the Iroquois company stated it would have to obtain rates of 50, 60 and 70 cents a thousand cubic feet, 50 cents for the first 10,000 cu. ft., 60 cents for an additional 5,000 cu. ft., and 70 cents for more than 15,000 cu. ft. This price would average 55 cents a thousand cubic feet, 10 cents more than the present rate, it stated.

Deputy Corporation Counsel Rupp objects to this additional rate just for the purpose of augmenting the natural gas supply with 10,000,000 cu. ft. of manufactured gas. Commissioner Pooley maintains the consumers of natural gas are entitled to a larger supply and the company is entitled to a higher rate if it has to pay more for this supply. Just what the increase will be is not yet known, because Commissioner Pooley has not given a decision. That the Iroquois company will get an increase is generally admitted, but whether the Public Service Commission will go as far as giving it the additional 10 cents remains to be seen.

As a result of the Public Service Commission enquiry into the natural gas supply, a rate case against the Niagara Gas Corporation has resulted. Corporation Counsel Rann and Deputy Corporation Counsel Rupp filed with the Public Service Commission an application to have the $1.45 artificial gas rate reduced.

Some time ago the Niagara Gas Corporation applied to the Public Service Commission for an increase, claiming that it cost it 70 cents a thousand cubic feet to manufacture gas in its Genesee Street plant, plus the cost of distribution and other overhead expenses. On the strength of this the commission ordered a rate of $1.45 a thousand cubic feet to artificial gas users. But during the past few weeks the arrangements have somewhat changed. The Niagara Gas Corporation has closed down its Genesee plant and is to turn it over to the Iroquois company to augment the natural gas supply. The Niagara people are supplying their customers with Semet-Solvay gas purchased at 37 cents a thousand cubic feet, a saving to them of 53 cents per thousand cubic feet.

The city came to the conclusion that as the Niagara corporation obtained the $1.45 rate because it was manufacturing its own gas, and it had now turned its plant over to the Iroquois company to increase its supply, the artificial consumers were entitled to the benefit of the saving the Niagara Gas Corporation obtains by purchasing gas at 37 cents a thousand cubic feet instead of manufacturing it at 70 cents.

Commission Upholds Service Charge

Wilkes-Barre, Pa.—The Public Service Commission has decided that the complaints of various West Side boroughs against the Luzerne County Gas & Electric Company are groundless in so far as they relate to violation of franchises, and has stoutly upheld the legality of ready-to-serve charges.

The commission has reduced the valuation of gas making property from $1,866,838 to $725,000 and this is a victory for neither side, for the valuation fixed by the commission is higher than the Welfare Association claimed and lower than the company estimated. The respective claims for depreciation together with the amount the commission has determined are as follows: For electric property, company $214,456, welfare association $5,899, commission $180,000.

Gas property, company $26,956, welfare association $11,640, commission $17,500.

The commission finds that the fair value of the company's property involved in this case, including proper allowances, is $4,800,000 for the electric property and $725,000 for the gas property, on which amounts it will allow a fair return of 7 per cent per annum.

Regarding the ready-to-serve charge, the commission says: "The commission has repeatedly upheld the legality of this form of charge, which has its counterpart in the demand charge found in so many electric schedules, and must again affirm its prior conclusion."

The commission points out that no testimony was offered as to the reasonableness of its use in this particular situation. The commission declares it is not convinced of the reasonableness of the rates now in force and calls upon the company to submit additional figures and testimony.

After dismissing the complaints of various West Side boroughs on this point, various recommendations are made to the company which will bring confirmation of their rules by the commission.